# Derivative Identities

with variable $\boldsymbol{x}$, constant $\boldsymbol{a}$, Euler's number $\boldsymbol{e}$, and various functions

---

$$\frac{\mathrm{d}}{\mathrm{d}\,\mathrm{x}}(a) = 0$$

$$\frac{\mathrm{d}\left(f(x) \pm g(x)\right)}{\mathrm{d}\,x} = \frac{\mathrm{d}\,f(x)}{\mathrm{d}\,x} \pm \frac{\mathrm{d}\,g(x)}{\mathrm{d}\,x}$$

$$[a\,f(x)]' = a\,f'(x)$$

$$[f(x)\,g(x)]' = f'(x)g(x) + f(x)g'(x)$$

$$\left(\frac{f(x)}{g(x)}\right)' = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

$$\left[\,f(g(x))\,\right]' = f'(g(x)) \cdot g'(x)$$

$$(x^a)' = ax^{a-1}$$

$$(e^x)' = e^x$$

$$(a^x)' = a^x \ln(a)$$

$$(\ln|x|)' = \frac{1}{x}$$

$$[f^{-1}(x)]' = \frac{1}{f'\left(f^{-1}(x)\right)}$$

$$\sin'(x) = \cos(x)$$

$$\cos'(x) = -\sin(x)$$

$$\tan'(x) = \sec^2(x)$$

$$\sec'(x) = \sec(x) \cdot \tan(x)$$

$$\csc'(x) = -\csc(x) \cdot \cot(x)$$

$$\cot'(x) = -\csc^2(x)$$

$$\arcsin'(x) = \frac{1}{\sqrt{1-x^2}}$$

$$\arccos'(x) = \frac{-1}{\sqrt{1-x^2}}$$

$$\arctan'(x) = \frac{1}{x^2+1}$$

$$\mathrm{arcsec}'(x) = \frac{1}{|x|\sqrt{x^2-1}}$$

$$\mathrm{arccsc}'(x) = \frac{-1}{|x|\sqrt{x^2-1}}$$

$$\mathrm{arccot}'(x) = \frac{-1}{x^2+1}$$